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Some New and Little-known Rotifers.

By W. Barnett Burn.

Am. Monthly Microscopical Journal. Vol. XVI No. 7.

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THE AMERICAN

MONTHLY

MICROSCOPICAL JOURNAL

CONTAINING

CONTRIBUTIONS TO BIOLOGY.

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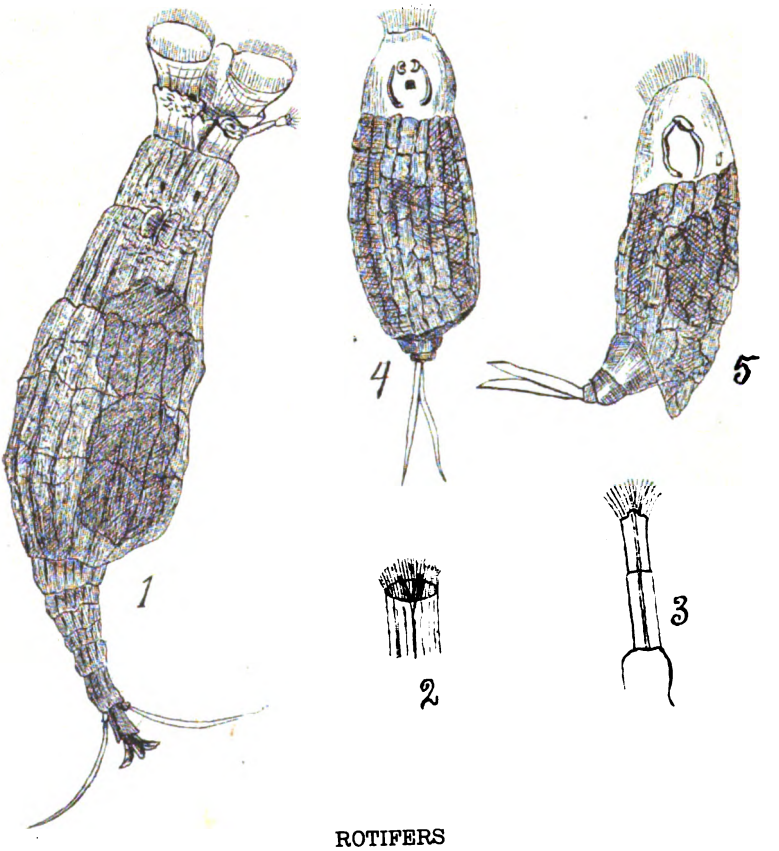

ROTIFERS

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THE AMERICAN MONTHLY MICROSCOPICAL JOURNAL.

VOL. XII. JULY, 1891. No. 7.

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Some New and Little-known Rotifers.*

BY W. BARNETT BURN, M. D.

[WITH FRONTISPIECE.]

PHILODINA TUBERCULATA.

This rotifer, shown in Fig. 1, is of large size, and occurs frequently in pools, yet it is not well known, and I do not think has been figured before. It is curiously like the *Rotifer tardus*, though in important points so different: whereas, though in all essential details coming very near *Philodina aculeata*, in aspect it is quite dissimilar.

In considering the points of resemblance of this species with *Rotifer tardus*, we notice the general outline, the brown color, the deep folds in the body, the proportion of the width of the wheels to the neck, and the habits and movements of both are the same; also the toes are somewhat alike, but here we come to the distinctive character of *Philodina tuberculata;* it differs from all its relatives in its long and slender spurs, and by this alone it may be recognized. *Rotifer tardus* approaches nearest to it in this particular, but the spurs are thicker, and the toes longer in proportion to them; in the former the last joint of the foot comes down over the toes, acting as a sucker, and, in doing so, flattens out, giving the appearance of the animal having four or five toes. Then there is the radical difference of the position of the eye, being in the rotifer in the frontal column and in the philodine in the neck; also, the former has only two teeth each side; the latter has three teeth on one side, if not on both. Sometimes many will be found having only two teeth on one side. I have counted sixty in succession with this peculiarity, and at other times have seen three on both sides always. Lord Osborne, who specially studied the teeth of rotifers, observed the same variation in *Philodina roseola*, and other observers in other species. It may be a case of knowledge coming and wisdom lingering, the third tooth being cut late in life when versed in the ways of the world.

*Science-Gossip.

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Two eyes may sometimes be seen in *Rotifer tardus*, in the neck, just above the mastax, which possibly might cause confusion; these belong to a fœtal animal; but one has to look so far down before one comes to the second mastax that it might be a means of easily separating closely allied species. The head is upwards in *Rotifer vulgaris* and *tardus*, downwards in *Philodina aculeata*, *Philodina tuberculata*, and *Rotifer macrurus*, but is this invariable?

The color of this rotifer varies considerably, probably chameleon-like from the tint of the flocculent deposit in which it lives; some may be found quite a light yellowish-brown; these are the younger ones; in these the internal organs are more easily seen; the mastax is surrounded by a considerable glandular mass, the buccal funnel stands out like a pouch from the front of the animal, its margin fringed with cilia, and leads straight down to the mastax, immediately under which is a large oblong stomach separated by a constriction from a similar shaped but smaller intestine; on the other side an oval ovary fills up the body.

The antenna (Fig. 3) is long, two-jointed, the joint very faintly marked; at the end are three small lobes fringed with cilia. The frontal column (Fig. 2) is rather wide in proportion to its length; among the cilia a small cleft proboscis may be seen immediately before the wheels expand. The tubercules are not well marked, and appear to be formed by the folds of the trunk; in its fully extended state, when it becomes worm-like, resembling *Rotifer vulgaris*, the tubercules almost disappear.

Philodina aculeata, frequently found with the one under consideration, is of a yellow hue, has the distinctive spines, the wheels do not exceed the width of the body, the spurs are small, and the end joint of the antenna is wedge-shaped, base forward.

DISTYLA FLEXILIS.

This rotifer, belonging to the family *Cathypnadæ*, which includes the common *Cathypna luna*, is represented in front view, Fig. 4, and in side view, Fig. 5. Mr. Gosse places it in the genus *Distyla* with some hesitation; there is indeed but little distinction between *Distyla* and *Cathypna*, the former being longer in proportion to width, and the curious lateral, bellows-like, infolding characteristic of the family being less marked.

In this group may be observed something like a state of sleep; the animal perches on its claw-like toes, bent at an angle under its body, and remains motionless for a time, as if visited by that "gentle sleep beloved from pole to pole," which most rotifers seem not to require. The little rotifer has to exercise greater perseverance than the little ant to acquire its daily provender, and, examine it when you may, from morn to dewy eve, or in the silent watches of the night, it is ever in a state of ceaseless activity. This group is interesting from being an exception to this general rule.

Distyla flexilis is small, about $\frac{1}{180}$-inch long and without color, except the one rose-red oblong eye, and a yellowish tinge in the stomach. The body is covered with folds, giving it an irregular tesselated appearance and making the outline fuzzy under a low power. It is active in its attacks on food, but remains near one spot for a long time, occasionally swimming about to seek "fresh fields and pastures new," yet

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I have left it under a $\frac{1}{8}$ objective, and at the end of an hour have found it still in the field.

This rotifer separates its toes literally like pincers, and seizes objects between them as if to get a better hold. The one figured came from Wimbledon Common, and was abundant in some water given me by G. Western, Esq.

The Work of the Microscope.*

By P. H. DUDLEY, C. E.,

NEW YORK, N. Y.

At no period in the history of the microscope have the results of its researches received as much attention as at the present time. The importance of the investigations in recent years, by its means, of many of the causes affecting the health and comfort of mankind, is just being recognized by the efficacy of the remedies which have been suggested from a knowledge of the causes. The indications of a new remedy are daily flashed from continent to continent by that unseen agency, electricity, its messages multiplied by the press in all languages and distributed through the land by steam's swiftest trains. These three great inventions of communication and diffusion of knowledge of to-day have carried the tidings to the peoples of all nations, and there is a common interest and thought upon the subject. History does not record a grander spectacle than that of the entire civilized world, brought into sympathy and interest by the investigations of the microscope, in search of relief for thousands of its sufferers from some of the occult conditions incident to life.

Animal or plant life, either of the highest or lowest orders, is surrounded by conditions, some favorable to growth, others unfavorable, and whether an animal or plant will survive or perish aside from the inherent vitality depends upon the preponderance of the favorable or the unfavorable conditions of environment. This law is coeval with the existence of life. To ascertain and understand the conditions favorable to the human race has and will always occupy the attention of a large portion of the more intelligent of mankind.

Some of the conditions are at once apparent; others equally important are unseen, obscure, and only discovered by tracing back from the effect to the cause. We experience effects and not causes, and to analyze the former, assigning each to its proper cause, is by no means an easy matter. The first step is to observe the facts, study their relations, and trace the laws controlling them. It is only in this way that any progress has been made, and then oftentimes the real nature of the cause remains undiscovered.

Jenner's important discovery of vaccination for small-pox a century ago was not the result of an accident as often stated, but close observation of a series of facts and studying their relations. That small-pox was due to a germ in the system invisible to the keenest vision is of recent demonstration by the microscope.

* Annual address of the President of the New York Microscopical Society, 1891, from *Journal of N. Y. Microscopical Society*.

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How early minute forms of life were suspected of causing bodily ailments or decomposition in fluids is uncertain. The Egyptians 3,500 years ago knew how to practically prevent decomposition in bodies and wooden utensils, so that they have been preserved to the present time. More recently, Robert Boyle, 200 years ago, expressed the opinion that ferments had something to do with fevers. Leuwenhoek, 1632 to 1723, made small lenses, and described the ferment of yeast as ovoid or spherical bodies, and discovered bacteria in the mouth and in fluids undergoing decomposition. The power and use of the early simple microscopes were too limited to definitely establish the functions of the minute forms or their relations to the higher orders. The belief, however, was becoming more and more general that the minute forms had something to do with bodily ailments and fermentations, but without microscopical aid it could not be clearly demonstrated. As must be expected, some extravagant views were adopted, while others were close approximations to the truth. Boerhaave, in 1693, distinguished three kinds of fermentations, viz., alcoholic, acetous, and putrefactive. Linnæus stated that a certain number of diseases resulted from animated invisible particles dispersed through the air. Spallazani, in 1769, started his series of experiments upon spontaneous generation and sterilization, resulting in the present method of preserving foods. Opinions were very conflicting, and the truth which may now be expressed in a line required years of labor to ascertain, and really follows the improvement in the microscope. In 1837 Cagniard-Latour described yeast as a collection of globules which multiplied by budding. In 1838 Turpin described the yeast plant in beer and named it *Torula cerevisiæ*. Many chemists were unwilling to admit the important part played by yeast in fermentations, and ascribed it to "catalysis," or action by presence. In 1843 the celebrated French chemist, Dumas, from microscopical and chemical examinations, clearly explained the physiological function of the living ferment yeast. The truth was now proven, but it made little progress until Louis Pasteur, some ten years later, took up the work of studying under the microscope the ferments of yeast, vinegar, and wine, demonstrating conclusively that a germ must be present to start fermentation or decomposition in fluids, that the definite knowledge he learned of the functions of the minute forms of life attracted attention.

Pasteur, by his systematic work with his microscope, tracing the life-history of many ferments from the spore, ascertained the laws of growth, so he could induce fermentation or check it as desired. The ability to keep liquids for years when freed from germs, which under ordinary circumstances would ferment or decompose in a few hours, enabled Pasteur to confirm and clearly set forth the general principles of the germ theory of minute forms of life in place of the theory of spontaneous generation. The theory so completed, revolutionizing current ideas, met with vigorous opposition, but the microscopical demonstration was so complete it has proven invulnerable, and upon it has been formed the important branch of science, bacteriology. We are too near to estimate the value of the demonstration. It will require time to show its full value, for its application is but really commenced.

Pasteur's work has been pre-eminently practical, and the results of his investigations at once applied to the French industries, in which

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interests they were undertaken. He saved the French silk industries from threatened destruction by investigating the parasitic diseases of the silkworm, and suggested a remedy. His investigations led to the antiseptic treatment in surgical operations which is now considered indispensable. His extensive experiments to obtain vaccines or attenuated virus for protective inoculations have been very successful, especially when the difficulties of producing an attenuated virus are considered.

The process for obtaining the protective virus for rabies may be mentioned. He inoculates a morsel of the brain of a mad dog into the brain of a rabbit, which attenuates the virus sufficiently to act as a protective inoculation for dogs, or men bitten by dogs, suffering from rabies. At first the attenuated virus from the rabbit was also passed through the organism of the monkey before using. This feature has been discontinued. This was the first successful step toward checking rabies. Pasteur has a large institute in Paris for the treatment of rabies, and there is now in this city a branch institute under the charge of Dr. Paul Gibier, where about 160 persons have been successfully treated during the past year.

Considering for a moment the higher orders of plant life, the microscope has shown conclusively that the functions of the fungi which we see upon them is to undo the structure which has been built up by the higher plants, returning the elements composing them to the air and soil. This is of itself a work of great economic value, and must be more generally understood to save our building timber and forests from the natural process of decay.

The rapid advancement of bacteriology in the last decade is largely due to the arduous labors of Koch, who, by extensive microscopical investigations, discovered the specific bacillus of several diseases, particularly of Asiatic cholera and tuberculosis. He originated a method of staining a specific bacillus so as to differentiate it from all others in enclosed tissue or other media, and found them when others not using as skilful methods failed. He originated a system of solid nutritive media for cultivating and isolating a specific bacillus, producing pure cultures. This has proven of the greatest value, for much has been learned as to the manner of growth and products secreted of each bacillus studied. With the pure cultures he carried out extensive inoculations on animals, and carefully noted the effects. The latter have been analyzed, resulting in his extensive experiments with his so-called lymph to check the bacillus of tuberculosis in the human system. It is this feature of Koch's great work which has made his name a household word to-day in all civilized countries.

Yesterday he gave to the world the formula for his great discovery, which, briefly stated, is a glycerine extract of a certain dilution from the ptomaïnes or the products of the bacillus itself.

The consensus of opinion from the tests is that it is a remedy of great value. Besides its direct benefits, the indirect ones will be even greater, for the publicity given by the press to this and kindred discoveries is rapidly educating the people to the important rôle played by the microbes in contagious diseases, and the necessity of efficient sanitary measures for our cities as a preventive. Check the causes instead of dealing with the dangerous effects, and have clean streets, wholesome water, and efficient sewerage. Any one or all of these, when not in proper con-

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dition, are efficient media for the growth of microbes detrimental to health, particularly in cities of warm climates. But few of our cities in warm climates have as wholesome water as is needed for domestic purposes, being so filled with germs as to be unsafe for many persons to drink without sterilization. The indifference of the people to these important matters is largely due to the fact that their nature and bearing are not understood. The reasons why the streets should be clean, the water wholesome, and that there should be efficient sewerage in our cities, are evident to health boards, but it needs enlightened public opinion to more thoroughly carry out the demonstrations of the microscope.

The Classification of Diatoms.

By C. M. VORCE,
CLEVELAND, OHIO.

In the very interesting paper of Rev. F. B. Carter in the May *Journal* I notice the omission of all reference to three genera of diatoms, some or all of which are sure to be found in the collections of most beginners who give the study of the diatoms any but the most cursory attention. These genera are *Actinocyclus*, *Amphiprora*, and *Rhizosolenia*. So far as I have heard, the first and last of these are only found in the waters of the great lakes, and chiefly in Lake Erie, but all are *liable* to be found in other bodies of fresh water, and should be included among the fresh-water forms.

Actinocyclus has the typical markings described for the fossil form, with a circlet of extremely minute intra-marginal spines, and is inflated, or kettle shaped. *A. niagaræ* is the fresh-water species, and may be looked for, although it is rare, in the waters of the great lakes from Chicago or Duluth to Oswego, and in the St. Lawrence river.

Amphiprora, as described by Mr. Carter, is best represented in fresh water by the common and widely distributed *A. ornata*, and may be recognized by presenting the shape of the figure 8, or that of a jews-harp or fiddle, according to which side is viewed.

Rhizosolenia, with the characters described, may be looked for in the waters of all the great lakes, and the form *R. eriensis* is often excessively abundant in the waters of Lake Erie.

It seems to me the classification of H. L. Smith would have been preferable to that of the Micrograpic Dictionary, although the latter, if closely studied, will help the beginner to a decision on most of the forms he will encounter.

—o—

A New Bureau.—Secretary of Agriculture Rusk has recently put in working order his new bureau in Chicago for the microscopic examination of hog products for export. He selected a corps of thirty microscopists, fifteen men and as many ladies, and they were set to work under the direction of Drs. John Michels, of New York, and F. H. Bernard, of Pittsburg, microscopical experts. The force will be increased until it is large enough to examine a piece of the diaphragm and of the tenderloin of each hog killed. Those found to be diseased will be condemned.

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A Universal Stand.

By A. G. FIELD, M. D.,

DES MOINES, IOWA.

Fig. 1 below represents a stand adapted to the wants of the professional or amateur who uses the microscope and camera. It consists of base *A*, 14 x 14 x 5 inches, to which is secured, by dovetail, glue, and screws, two uprights, *B*, *B*, 5 x 1 inches, one three and the other seven feet in height. These are precisely perpendicular to base, to bring instruments and object in line when centered. They are grooved on edges to receive tongues or arms *C*, *C*, *C*, *C*, of the secondary base *D*, and also on the camera carrier *H*. The uprights are made firmer by additional pieces extending up thirty inches from the base. The secondary base, 14 x 14 inches, is corner-braced as shown, and is adjustable as to height, being secured in desired position by set screw *E*.

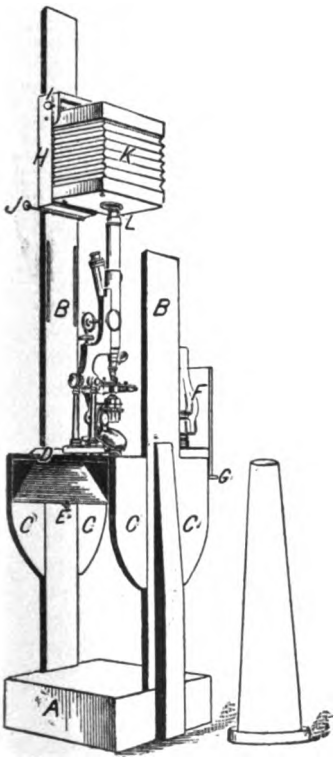

Fig. 1.

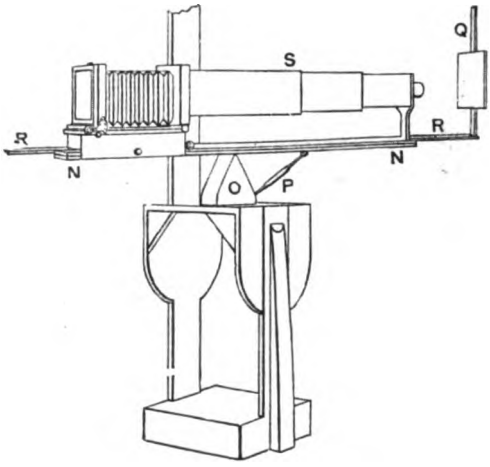

Fig. 2.

In the centre is a hole, one and a half inches in diameter, which receives the tube of the microscope when it is placed on the base for high amplification in photo-micrography, and also the gudgeon of the support of the base-board *O* when used in copying or photography. *G* is a

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lamp-rest which slides on cleats attached to the corner braces, and has an upright for concave reflector when desired. *H*, sliding carrier for camera, with tongued arms of sufficient width to bring the photographic lens collar precisely over the microscopic tube when centered on either base. *I*, set screw to retain it in position, and *J*, milled head of pinion by which it is racked down to attach camera, *K*, to eye-piece of microscope. This light-tight connection is made with one-half of child's rubber ball, perforated in centre to fit neck of eye-piece, and of sufficient size to fill the collar of the photographic lens.

Fig. 2 illustrates the use of the stand in copying, enlarging, and reducing, and requires but little explanation. *N*, *N*, base board, 5 x 1 inches, 4 feet long, grooved on edges to receive tongues on arms of camera carrier. It is hinged to apex of wedge-shape block, *O*, the gudgeon of which fits snugly into the hole in centre of supplemental base. *S*, telescopic boxes. *R*, *R*, slat passing beneath the camera carrier, with upright, *Q*, for carrying the picture to be copied, the distance respectively between the lens and picture and lens and ground-glass being regulated by the operator without leaving his position at the focusing screen, so that all copies may be brought to a uniform size, as for lantern slides, without regard to the size of the original. Removing the telescopic boxes and slat, we have a convenient camera stand for inside use, the lateral movements being secured by the gudgeon attachment, and the vertical by the screw brace, *P*.

If used ordinarily as a microscope stand, the instruments are always in line and position for photo-micrography.

Distribution of Diatoms.—Mr. Isaac Robinson, of Hertford, England, says:

"The distribution of the diatomaceæ is much assisted by the swollen condition of our streams and rivers after heavy rains, and in many cases they contribute an appreciable proportion of the muddy coloring matter which the river contains. On the 8th of April I took from the river Lea at Hertford, for the purpose of microscopical examination, one pint of water. The water was at the time much discolored in consequence of there having been a considerable rainfall on the previous day, amounting to nearly half an inch. On carefully examining the solid matter contained in this small quantity of water, I was surprised to find upwards of fifty species of diatomaceæ, some of which were very numerously represented. I should state that these were not such as were simply floating on the river, but that, after agitating the surface of the water, the bottle was filled by placing its neck several inches below the surface. This distribution is further facilitated by dry dust in summer, and what is known as dust storms, in the solid matter of which Ehrenberg detected upwards of a hundred species."

——o——

Staining Sections.—Very fine cellular structures may be rendered plainly visible by coloring them with an ammoniacal solution of carmine, to which a surplus of acetic acid has been added, and afterwards allowing them to remain for two to ten hours in a weak solution of ferric sulphate. This is a very useful method for bringing nuclei into view. The black coloration appears to be quite durable.— *Verhandl. d. Ces. Deutsch. Naturf. u. Aertze.*

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Introduction to Elementary Biology.

By HENRY L. OSBORN,

HAMLINE, MINN.

Part II.—The Cell.

(*Continued from page 127*)

Not the least wonderful peculiarity of protoplasm is the multitudinous shapes and associations in which we know it. The bodies of all the higher animals and plants are composed of elements or units called cells, each of which is or has at some time been a minute mass of protoplasm and products manufactured by protoplasm. In their earliest history all cells, however much they grow to differ, are minute globules usually nearly or quite spherical and filled with protoplasm. The cell is coated with a very thin envelope called the cell-wall, the chemical nature of which is the same in nearly all animal cells, and is albuminous, and in all plant cells is starchy. In the centre of the protoplasm there lives a denser body called the nucleus, which is marked off from the remaining protoplasm by a distinct boundary line. The nucleus is composed of protoplasm, but of a kind not wholly like that of the cell at large. The nucleus, the protoplasm, and the cell-wall are thus the component parts of all young cells. Fully grown cells differ very much in regard to the protoplasmic powers they exercise most, some becoming chronic metabolizers, while others are equally habitual in the exercise of the powers of motion or irritability. Cells which thus specialize one or other of these powers have shapes to match, and it thus becomes possible to infer the action of a cell from its shape. Sometimes cells produce by metabolism certain chemical substances which they store away inside the cell-wall, enlarging the wall for the purpose of forming spaces called "vacuoles" in the protoplasm for the reception of these products. Such matter is called "formed" or "dead" matter in contrast with the protoplasm, which is called "formative" or "living" matter. The large bodies of animals and plants are aggregates of cells and of the formed nature which the protoplasm has produced. Since all of these can be produced from gases or liquids it is reasonable that they should be returnable to that state from which they came, and this we know to be true.

Amœba.—We shall do well, if we are to understand protoplasm and its powers and products, to examine some specimen of live protoplasm, for though the chemist is denied the privilege of analyzing living protoplasm, the biologist can spy upon its proceedings for indefinite periods without destroying the substance. One might examine any of a large number of specimens of living cells as our first specimen, but we can begin very well with amœba. This is found in stagnant, slimy, warm fresh water. It is very minute and must be sought and studied with a magnifying power of at least 300 diameters. It has been often described and the reader should consult some of the fuller text-book descriptions. We may briefly say that it is much the shape of a drop of water which has fallen and spread out irregularly. It has a faint translucent border enclosing a finely grained faintly yellowish substance. The granular substance within is active protoplasm, a portion of which, slightly different in character, is the boundary. No distinct cell-wall

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exists. The protoplasm surrounds several globular bodies which are found to contain diatoms and alga-spores and other living creatures still minuter than amœba; these globules are called "*food-vacuoles.*" In addition to food-vacuoles amœba presents one vacuole which contains no food, and which now and then shrinks up and disappears, to later suddenly appear again. This is the "*contraclile vacuole.*" One other part is present in amœba but invisible in the living specimen; it is the nucleus. Briefly, then, amœba is a minute drop irregular of outline of protoplasm which presents the following parts, viz: 1. Food vacuoles. 2. Contraclile vacuoles. 3. Nucleus.

Amœba Physiology.—Since amœba is protoplasm we may expect some or all of the protoplasmic powers. What, then, can amœba do? It can move. As you watch it under the microscope you observe a flow among the granules which compose it. Movement results in a circulation within the drop and change in the shape of the drop. The substance flows toward one side and away from the other and the drop thus moves from place to place. In this way amœba glides about and soon escapes from the field of observation unless followed. It can metabolize; this cannot be actually seen, for we cannot observe the molecular structure no matter how well we are equipped with microscopical appliances, but we can infer it, for amœba's substance does not waste away but rather increases in bulk, and oxygen is undoubtedly used up and carbonic acid and ammonia given off, though in too small amounts to be easily detected. It can feel stimulation, and this we can see, for if we make amœba swim between the poles of an electric battery and then send a gentle current from pole to pole, amœba shrinks up into a ball, but presently resumes its motion until it feels a second shock. Amœba protoplasm thus can perform the various acts of protoplasm. The constant activity of amœba may at certain times cease, and later be resumed, and we therefore say that amœba is *automatic* or self-controlling. All living things are thus *self-directive.*

Other Cells and their Powers.—We shall have a better idea of cells by briefly noticing a few other kinds and their powers. A cake of compressed yeast consists of millions of cells mixed with grains of starch. Single cells are oval in outline and are composed of a wall, within which is the protoplasm not filling the cell, but leaving one or more central spaces, "vacuoles," which are filled with water and dissolved chemical substances. If the yeast be thinned with a weak solution of sugar and set aside in a warm chamber for a few hours, it will have produced a certain amount of carbonic acid gas which will give a sour odor and a bubbly look to the fluid, and the cells will have produced buds or smaller cells, which may have in their turn produced still other buds. Here, then, are cells which are actively producing chemical changes or metabolisms, anabolizing sugar, and increasing the bulk of protoplasm, and katabolizing, something which produces carbonic acid, a very simple chemical compound. Yeast cells cannot go on very long producing protoplasm and growing in bulk by budding, unless they have a better diet than sugar and water.

Plant hairs, as, for instance, the hairs on the stamens of the spiderwort or many other plant hairs, are rows of oblong cells with a firm boundary wall of cellulose and within a thin lining of protoplasm, which lining is in communication with the centre where the nucleus lies by

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numerous branching strands of protoplasm. In these strands the granules can be seen circulating up and down the strands and out upon the lining. Here, then, we have the second power of protoplasm motion, but not a motion which alters the shape of the cell. Upon the surface of the leaf of Venus fly-trap, a plant which grows in the bogs of North Carolina, there are sensitive hairs, the slightest touch upon which is followed by the instant closure of the two halves of the leaf. Here must be irritable cells. The cells of the potato tuber are very thin walled and in the grown cells the protoplasm has disappeared, and the cells were full of starch, a product of the anabolic power of the protoplasm. The cells of the bean seed-leaf are filled with albumen grains, another substance produced by the anabolic power of cell protoplasm. Plant cells in general are notable for the high degree to which they have specialized the anabolic function, and they can make multitudes of compounds from the simple mineral ingredients of the air and soil. Animal cells on the contrary have in general specialized the motor and irritable functions, though they have by no means discarded the metabolic functions, but in animal the katabolic functions predominate and elaborate compounds enter their body which were prepared by plant cells and comparatively simple compounds leave it.

Resumé.—We, then, are permitted to regard the cell as a being endowed with the powers already considered as belonging to this mysterious substance, protoplasm, and we find that bodily structure of either plants or animal introduces us to these elements operating various of these powers. We shall next consider some of the conditions of cell life and the results of combined effort and division of labor among cells, or, in other words, tissues.

[*To be continued.*]

Examination of Insect Powder.*

By N. J. NITZSCHMANN, Ph. G.

Persian or Caucasian insect powder consists of the flowers of *Pyrethrum carneum* and *P. roseum* growing upon the Caucasian Mountains, at an elevation of about a mile. Dalmatian insect powder is the product of *P. cincrariæfolium*, and it is more powerful than the Caucasian powder. Insect powder does not appear to be poisonous to man, though it is said to cause some confusion of the head in those who sleep in close apartments where much of it has been used.

It has been held until very recently that insect powder owed its insecticide properties to the minute subdivision in which the particles existed, and that they acted mechanically by clogging and filling the air-passages. Late investigations, however, have settled the fact that though the powder does act in this manner to a certain extent, its greatest insecticidal properties are due to a true poisonous principle whose nature has not been positively determined. Some claim that it is an alkaloid, while others say that it is a soft resin. The powder exhausted by means of alcohol is harmless to insects, while the fumes of the burning powder is very destructive to them.

Insect powder has been used as a dressing for ulcers and wounds to prevent the formation of maggots. It also answers to preserve dried

* Read before the St. Louis Club of Microscopists.

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insects and plants in cabinet collections. Twenty-five grains of the powder stirred up in two quarts of water were sufficient to kill young cotton worms. The tincture has been recommended by Jaeger as a protective against the bites and annoyance of insects. He declares that in traveling and hunting in Asia and other tropical countries one single application of the tincture over the hands, face, and beard always gave him at least twelve hours immunity from the attacks of all kinds of insects, even white ants, which are the greatest plague of those regions. According to Professor Maisch, it is capable of producing a vesicular eruption like that of poison ivy.

Pyrethrum flowers, grown in and around Berlin, have been experimented upon by Dr. Unger, with the view of determining their insecticidal powers. The *Pyrethrum roseum* was found to be quite efficient, killing in three-quarters of an hour; but the variety known as Caucasian was not so well adapted for use as an insect powder; the insects were stupefied somewhat by it, but rarely killed. *P. carneum* was totally inefficient. Dr. Unger thinks that the first-named variety may be cultivated with profit in and around Berlin.

The demand for the powder having much increased of late, it is said to be adulterated with the leaves and stems of the plant, hellebore, turmerie and other adulterants. Some writers claim that hellebore is destructive to insects, but Marpman made a practical test of the value of hellebore as an insecticide. Placing some true insect powder and some flies under one tumbler and imprisoning an equal number of flies under another glass with powdered hellebore, he found that while in a very short time the insects in contact with pyrethrum were paralyzed; after the lapse of twenty-four hours no change could be noted in those in contact with hellebore. I made a microscopical examination of seven specimens of insect powder; two of the specimens were obtained from grocery stores. The method for examination was to remove the color of the powder by means of alcohol, then removing the alcohol and adding a little oil of cloves, and mounting in Canada balsam. I used a one-fifth inch objective in examining the various specimens, and found one specimen to contain starch; by means of polariscope I found this to be potato starch. Two of the specimens contained pollen, while in the other five specimens I was unable to find any. Some of the specimens contained portions of the leaves and stems of the plant. I also examined for hellebore and curcuma, but found none in any of the specimens. Powdered hellebore and curcuma, as found in the drug stores, is a much coarser powder than insect powder.—*Meyer Bros., Druggist.*

Diatomaceous Earth at Montgomery, Ala.—Mr. K. M. Cunningham, of Mobile, Ala., discovered on May 8, 1891, a bed of infusorial (diatomaceous) earth at Montgomery, Alabama. The deposit outcrops in a ravine, and has a thickness of from five to twenty feet. Mr. Cunningham states that vast beds of siliceous pebbles underlie and overlie the stratum. Evidences of plant remains are occasionally found in the stratum, but are friable and very much compressed. This discovery will prove of interest as affording a contrast to the fresh-water fossil deposits of the New England States. As far as we are aware, this is the first mention of a fresh-water fossil deposit occurring in the Southern States.

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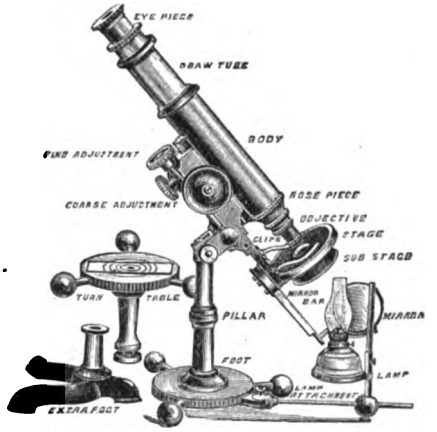
A Consideration of Some of the Parts of a Microscope Stand, of Interest to Pharmacists.*

By Dr. H. M. WHELPLEY, F. R. M. S.,
ST. LOUIS, MO.

There is a constant increase in the number of pharmacists who study the use of the microscope as it is applied to the drug business. This, of course, has the effect of causing a greater demand for instruments which are employed in drug stores. I have sometimes thought that an enterprising manufacturer of optical goods would place on the market a microscope especially designed for the use of pharmacists, or, at least, one that could be advertised as being especially a "druggists' microscope." It is not probable that, as yet, the demand from pharmacists has become sufficiently great to attract the special attention of manufacturing opticians. I do not consider this, as might be expected, a source of regret; for, in reality, the pharmacist does not require a special instrument, rigged with novel devices and decked with new accessories. The needs of the druggists are met by the microscopes which are already in the market. In selecting an instrument, the first thing for consideration is the stand. With a good stand for work, the druggist is ready to add and make use of such quality of optical parts as his requirements may suggest and his means justify; but with a poor stand the possessor is always at a disadvantage, even with the best of optical parts.



Griffith Club Microscope.

The *stand* may be defined as a compound microscope without optical parts. Since the optical parts are the only esential portion of a microscope, and we can do no work whatever without them, this may seem like defining a gun as the portion of that fire-arm without lock, stock, or barrel; but such is not the case. The stand is devised solely for the purpose of using the optical parts to the best advantage. Therefore, any one can readily see that the more perfect the stand the greater the amount of work to be accomplished with the complete instrument,

*Read before the St. Louis Club of Microscopists.

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and the more perfect and satisfactory it will be. In considering the various parts of the stand, the above illustration of the Griffith Club Microscope will serve to make them clear:

The *base*, or lower portion of the stand, first attracts our attention. Instruments can be found with bases of almost all conceivable forms, but the only one suitable for druggists is the tripod.

The *feet* forming the tripod may be disguised in the form of the base; but that does not matter, so long as there are three, and only three, points of support. This not only gives the greatest stability to the instrument, with the least tendency to vibrate when the table is jarred, but also has other advantages. One of these feet should always point toward the observer. This is of importance to the pharmacist, who has frequent occasion to incline the instrument while measuring or drawing objects by means of the camera lucida. The only exception to this is when the tripod has two long feet, as shown in the extra foot of the above illustration. In such a case it is justifiable to have the short foot directed from the observer.

The *pillar*, or *support*, requires no special attention. With some instruments it is single, while others have a double support, so that the mirror bar swings between them. Pharmacists are not especially interested in either of them.

The *joint* seen at the upper end of the pillar is a feature of more importance, and every pharmacist should see that his instrument can be inclined to any desired angle. If it is required that the instrument be used upright, it can be so employed just as well as the stiff-backed ones that we still see in the market. However, it is seldom that a druggist has occasion to use an instrument in that awkward position. This joint is usually a single hinge, but it may be secured by means of trunnions, and in such cases is usually provided with some means of tightening or loosening the bearings. Some instruments can be locked with the body at any desirable angle. This, however, is not necessary for a pharmacist's use.

The *arm* is not very prominent in our illustration. It is the portion above the joint, and bears the body. In some instruments it is prominent and closely resembles in form the flexed human arm. If it supports the body firmly, that is all that is required.

The *body* is supported by the arm, and has attached directly to it the optical parts of the compound microscope. The body varies in size and length in different instruments. The size is not of very much importance, but in length it should be what is known as "standard," or be so arranged that it can be lengthened out. The body must be perfectly black inside, and this is best accomplished by means of black cloth. Cloth is more permanent than the blackened metal surface.

The *draw tube* is found only in the better class of instruments, and is a provision for adjusting the length of the body. With very high power objectives it is very essential to have a draw tube. It should be marked to indicate when the body is "standard" length. A great convenience is a "society screw" in the lower end of the draw tube. Pharmacists have frequent occasion to use quite low powers, and if the low power objective is placed in the draw tube there will be plenty of working distance, which I have found is not the case with some instruments. Again, it enables the pharmacist to place the analyzer of the

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polariscope in the draw tube where there is no working distance for it with low powers.

The *collar* is the ornamental ring or projection at the upper end of the draw tube, or of the body when there is no draw tube. It is unimportant to the pharmacist.

The *nose piece* is the portion at the lower end of the body. It is provided with a female screw, into which the objective is fastened. By all means purchase a microscope with what is known as the "society screw," so that any ordinary objective can be fitted to it. I have found that the English thread in the "society screw" is not quite the same as the American, and I was obliged to get an adapter for the use of English objectives on an American stand. This nose piece has nothing to do with the double, triple, and quadruple nose pieces, which are accessories, and not a part of the stand.

The *stage* is of importance. The best for the use of pharmacists are made of glass, so that they are not affected by liquids or chemicals. It is an item to have a thin stage which admits of oblique illumination in the examination of crystals. The expensive mechanical stages are very convenient, but not essential for the use of a drug clerk.

The *sub-stage* must be so arranged that it will admit of the use of sub-stage condenser, polariscope, etc. It is hardly worth while for a pharmacist who expects to do much work to purchase a stand without a sub-stage.

The *diaphragm* is a contrivance for regulating the volume of light which is admitted to the object. When a sub-stage is present, the diaphragm is adjusted to it; otherwise it is attached to the stage in place of the sub-stage.

The *mirror bar* and its arrangement is plainly shown in the illustration. All modern microscope stands have the mirror bar so attached that the mirror can be raised above the stage for the illumination of opaque objects. This is a great convenience for the pharmacist who has many substances to examine by reflected light. It is best to have a mirror bar which can be lengthened or shortened as may be required.

The *mirror*, if single, must be a concave one. Where there are two, one is plain and the other concave. As far as the plain mirror is concerned, the size does not make much difference, but the larger the concave mirror the better. Pharmacists can use any mirror adapted to ordinary work.

The *clips* are for holding the slide in position. The ones which can be removed are preferable for a pharmacist who occasionally has liquids to examine, when the clips are in the way unless removed.

The *coarse adjustment* is found on all instruments. The rack and pinion arrangement is the best, and is the one used on the better class of instruments.

The *fine adjustment* or *micrometer-screw* is also a feature of the better instruments, and should be present on every one owned by a pharmacist who intends to do much work. It is much more convenient to have the fine adjustment near the coarse one. By all means avoid the instruments with the fine adjustment on the body near the nose piece. They are inconvenient, and the use of them has a tendency to vibrate the body of the instrument.

As stated above, the ocular, or eye piece, and the objective do not

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belong to the stand, so I will not consider them here. The lamp and attachment, as well as the turn-table, shown in the illustration, are ascessories which require special description, not in place at this time.

The American Society of Microscopists.

By Dr. F. L. JAMES,
ST. LOUIS, MO.

This Association, now in the thirteenth year of its existence, will hold its fourteenth annual meeting in Washington, D. C., August 10, and continue in session five days. Its roll of active members contains about three hundred and fifty names. Its membership consists of two distinct classes, viz: professional men and students of the natural sciences, who use the microscope in their daily vocations as an instrument of research, diagnosis, or precision; and amateurs, or those who find pleasure and profit in the revelations of the instrument. Many of the latter class, from having early chosen special lines of study and investigation, have acquired high reputations in their respective departments of microscopical research. In its earlier years this class predominated in the membership of the Society, but at present the professional element is largely in excess.

The qualifications for membership are very simple. The applicant must be a respectable person socially, and interested in the use of the microscope.

The advantages of membership are dual in their nature, *i. e.*, general and social, or those which accrue to the individual from association with others engaged or interested in the same pursuits in any and all walks of life; and special, in that the meetings of the Society are to a certain extent educational in their nature. In the "Working Sessions" experts in every department of microscopical technology are engaged in giving manual demonstrations of the details of their lines of work; in the informal evening "conversaziones" the room of every worker who has anything special to exhibit or demonstrate is open for the reception of all those who wish to witness the demonstration; finally, the soirée affords an opportunity of displaying for the benefit of the members, as well as the public generally, all that is most beautiful, interesting, and instructive in the cabinets or laboratories of the exhibitors. Of late years the soirées have been attended by many thousands of visitors in every city in which the society has met, and have been regarded as distinguished social as well as scientific events.

The dues are trifling, only $2.00 per annum, and in return the member gets a volume of the Annual Proceedings, which costs very nearly this amount. These procedings are elegantly and profusely illustrated with photo-engravings, autotypes, chromoliths, and wood engravings, done in the highest style of art. There is scarcely a subject in the whole range of microscopical work upon which information may not be found by reference to the indexes of these volumes, and collectively they form a library of microscopy full of invaluable matter to the student and worker.

The railroads have of late years extended excursion or convention rates to and from the places of meeting, and, although no arrangements have as yet been definitely made, we can assure our readers that the

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Washington meeting will be no exception to the rule. Indeed, it is probable, from the fact of the meeting of the American Association for the Advancement of Science in Washington only three days after our adjournment, that a more than usually advantageous arrangement may be obtained.

The museums and libraries, as well as the many other objects of interest of the National Capital and its surroundings, will be open to the visits of the members, and special facilities for seeing them will be accorded.

Special hotel rates will also be secured. An announcement of the railway fares, hotel rates, etc., will be made hereafter.

In view of the facts related and from assurances that we have already received we are justified in saying that there will be present the largest number of old members of the Society ever in attendance at an annual meeting.

We invite and urge upon all persons, professional or amateur, interested in microscopy and not already on the rolls, to send in their applications for membership to the Secretary, Dr. W. H. Seaman, No. 1427 Eleventh street, Washington, D. C. The application should be accompanied by $3.00, which is the initiation fee and one year's dues. As it is more than probable that the initiation fee will be increased in the near future, it will be to the advantage of all who contemplate membership to send in their applications before the next meeting.

Any further information concerning the Society or the approaching meeting may be obtained on addressing any of the undersigned.

Frank L. James, President, Box 568, St. Louis, Mo.

W. H. Seaman, Secretary, No. 1424 Eleventh st., Washington, D. C.

C. C. Mellor, Treasurer, No. 77 Fifth Ave., Pittsburgh, Pa.

BACTERIOLOGY.

Bacteria in Drinking Water.—Dr. W. Migula (*Centralbl. f. Bakt. und Parasitenk. Bd. VIII, No. 12, p. 353*) makes a contribution to our knowledge of this subject which is really a new departure as regards the examination of drinking water. He points out that, although considerable stress has been laid on the examination of water for pathogenic organisms, there is no reliable rule to guide the hygienist in his examinations for the ordinary saprophytic organisms and their relation to the purity of water to be used for drinking purposes. Dr. Migula washes out small flasks with bichloride of mercury, then, after rinsing them with the water to be examined, he leaves a specimen in the flask, which is plugged with sterilized cotton wadding and covered with an india-rubber cap. It is not necessary to pack the flasks in ice as it is assumed that if any of the organisms multiply they will all do so, whilst if the putrefactive organisms (those that liquefy gelatine) grow more rapidly than the others, independent evidence is obtained of the impurity of the water. Cultivations are made in flat glass dishes in order to save the time required in manipulating plates and tubes during the cooling process. After examining 400 springs, wells, and streams the author has come to the conclusion that where there are

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more than ten species in any sample of water, especially when these are not species ordinarily met with, the water should not be used for drinking purposes. He found that only in fifty-nine waters was this the case, but that 169 waters contained more than 1,000 organisms per cubic centimetre, sixty-six of these having over 10,000 (forty over 50,000). From these figures it will be seen that some of the sources of supply would be condemned by the old method but would be passed by the new, and some condemned by the new would be passed by the old. Migula found in all twenty-eight species, and in a series of tables he brings out the fact that the number of colonies does not by any means correspond with the number of species, though in some cases it undoubtedly does so. This is, in fact, an exceedingly variable quantity. It also comes out that putrefactive bacteria are almost invariably absent from spring water; that they are most frequently found where the number of species is great, and where the number of colonies is between 1,000 and 10,000 per cubic centimetre; that they also occur where the number of germs is below fifty per cubic centimetre, but very seldom where the number is over 10,000.

Dr L. Schmelk. who recently (*Centralbl. f. Bakt. und Parasitenk., Bd. IV, No. 7, p. 195*) pointed out there is a great increase in the number of bacteria in the water supply of Christiana during the period that the upland snows are melting most actively, now (*Centralbl. f. Bakt. und Parasitenk., Bd. VIII, No. 4, p. 102*) gives further evidence collected during the last three years in proof of his theory. The numbers he finds for those years were ten or fifteen per cubic centimeter in March to 2,500 in April, 1888; 1,100 in 1889, and on March 28, 1890, 5,000; the breaking up of the winter snows having occurred this year much earlier than usual. This is the period during which the winter snows are melting, and after this is completed there is no marked increase in the number of bacteria in the lake water until the reappearance of the winter snows, some of the earlier falls of which during October, November, and December melt and disappear. In December the number of bacteria per cubic centimeter sometimes reaches 600, the highest point recorded during the year except in March. Dr. Schmelk thinks that the increase is due to the action of frost in breaking up the earth's surface, from which the contained organisms may be set free as soon as a thaw occurs and then washed away along with the surface soil just as during great rain-storms. He also points out that the masses of ice projecting into a river may form "collecting" points for the particles suspended in the flowing water, as more bacteria are always found in the water obtained from such ice when melted than in the river water itself. He verified this by repeated experiments. He found, however, that when floating ice was melting in water, though it contained a few more organisms than water collected near the surface, it held far fewer than water taken from a considerable depth. In the Christiana water-supply he found some thirty species of bacteria, some of which occurred very seldom, some at certain periods of the year only, and a few all the year round. The amount of solids in the water varies from time to time, between 0.92 and 0 94 grammes per liter, and traces of ammonia can usually be found in water during the time that it contains most bacteria.—*Supp. British Medical Journal.*

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Antiseptic Memoranda.—In measure, as our knowledge of antiseptics widens, the fact becomes more evident that each disinfecting agent has its special province, and each micro-organism its peculiar antagonists. One substance alone, namely, corrosive sublimate, is known as a universal microbicide; but its highly poisonous properties and other reasons render the substitution of other antiseptics often desirable. Hence the necessity of a better insight into the exact behavior of each antiseptic with the different germs of diseases. An important contribution to this branch of science has just been made by Drs. Thoinot and Masselin, who have just completed a thorough investigation of the efficacy of sulphurous acid gas as an antiseptic. It should be explained that the experimenters, both skilled and well-trained gentlemen, had at their disposal the resources of the Pasteur Institute microbiological laboratory and the use of some vacant wards at the Charity Hospital. Owing to some of these facilities they were enabled to procure or prepare the various septic agents; to test their virulence before and after exposure to sulphurous gas; to conduct the disinfecting operation under conditions closely similar to those of current practice, and, in fine, to bring into play all the nice exactness now indispensable in scientific researches that are to stand the fire of modern criticisms.

The following were the viruses tested; (*a*) Pasteur's septic vibrio; (*b*) bacterial or symptomatic charbon; (*c*) bacteridial charbon; (*d*) tuberculosis; (*e*) glanders; (*f*) typhoid fever; (*g*) diphtheria; (*h*) Asiatic cholera; and (*i*) Guadaloupe farcy. Each virus was simply exposed to the sulphurous acid in a room of fifty cubic metres capacity, tightly closed with putty. The gas was evolved in various proportions, but the quantity of sulphur consumed noted in all cases. Now as to the results: (*a*) septic vibrio, or Pasteur's septicæmia, was tried under four forms—that is, as bouillon culture, dried culture, serous discharge from a septicæmic guinea-pig, and septic powder. The last, obtained by drying the discharge to the shape of varnish on a glass plate and powdering, is exceedingly virulent. Sulphurous acid gas proved, even in large proportions, utterly powerless in all cases. (*b*) Symptomatic and (*c*) bacteridial charbon remained unaffected, as a rule, though large proportions of sulphur fumes continued for forty-eight hours will occasionally have some effect. (*d*) Tuberculosis in cultures supplied by Professor Nocard, and in the form of sputa, fresh and dried. In all cases Koch's bacillus was found to have been destroyed by a twenty-four hours' exposure to the fumes, in the proportion of 60 grammes of sulphur to the cubic meter (28 grains to the cubic foot). Even in the most refractory form, the sputa, the bacillus will be killed, but the full dose of sulphur is necessary. (*e*) Glanders; cultures of full virulence will be destroyed after twenty-four hours' exposure to the fumes of 60, and even 50 or 40 grammes (28, 23, and 19 grains) of sulphur to the cubic foot. (*f*) Typhoid fever; cultures of Eberth's bacillus from the morbid spleen. Complete destruction after twenty-four hours with 60 grammes of sulphur. (*g*) Diphtheria; cultures supplied by Dr. Roux. After twenty-four hours and 60 grammes of sulphur all Klebs' bacilli were entirely destroyed. (*h*) Asiatic cholera; the only cultures procurable being rather old, the proof cannot be said to be quite satisfactory, yet the bacilli were easily affected by even small doses of sul-

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phur. (*i*) Guadaloupe farcy; virulent cultures of this peculiar affection of the ox, obtained from Professor Nocard, were invariably rendered inert after twenty-four hours' exposure to 60 grammes of sulphur, but smaller proportions were unreliable. To recapitulate, sulphur fumes may be considered useless with septic vibrio and charbon. But in 60-gramme doses to the cubic metre, and after twenty-four hours' contact, they may be relied upon to destroy tuberculosis, glanders, farcy, typhoid fever, diphtheria, and probably cholera germs. The germ of scarlet fever remaining as yet unknown, no experiments could be instituted. At the same time this instructive series of discriminating experiments explains why some good authorities speak so highly of sulphur fumes as an antiseptic, while other equally good authorities have pronounced them nearly worthless.—*Therapeutic Gazette.*

Simplified method for preparing Meat-Pepton-Agar.—Mr. N. Tischutkin prepares and filters meat-pepton-agar in the short time of 2–2½ hours. The requisite quantity of agar is placed for 15 minutes in a dilute solution of acetic acid (5 ccm. acid acet. glacial in 100 ccm.). The swollen agar is then carefully washed, free from acid, and then mixed with bouillon. Boiling for 3–5 minutes suffices to make a perfect solution of the agar in bouillon. After neutralizing and cooling down, the whites of two eggs are added, and the mixture placed for half to three-quarters of an hour in a Koch's steamer. It is next filtered through Schulze's paper.—*Jour. Royal Micr. Society.*

Medical Microscopy.

By F. BLANCHARD, M. D.,
WASHINGTON, D. C.

Methyl Blue Again.—Dr. H. Beyer, of Stapleton, N. Y., writes to the *Medical News* that he has used methyl blue in fifty cases of pharyngeal diphtheria with successful results in all. He applies locally a powder consisting of methyl blue 2 parts and sugar 98 parts.

Milk from Tuberculous Cows.—Bang records some experiments that tend to show that milk from tuberculous cows does not convey the disease, unless the udder is tuberculous. Milk from tuberculous women fed to rabbits did not infect them. Milk from cows with tuberculosis of the udder proved highly intectious when fed to rabbits. Lesions developed in the glands about the pharynx.—*Centralblatt f. Chirurgie, April, 1891.*

Bacilli of Malignant Edema in Musk.—Several cases are on record in which hypodermic injections of tincture of musk have been followed by malignant edema and death. Recent experiments by Dr. J. Van Cott, of the Berlin Hygienic Institute, show that the bacilli come not from the musk itself, but from the animal's bag in which the musk is contained.

Adulteration of Musk.—In connection with the above item, it is well to note a recent chemical and microscopical examination of a sample of "pure Thibet musk," made by Th. Winimel, of Hamburg, and recorded in the *Apotheker Zeitung.* He found it adulterated with starchy matter, vegetable cellular tissue, and water to the extent of more than 25 per cent.

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Benzine as an Antiseptic.—In the *Cincinnati Lancet Clinic* for Feb. 7, 1891, Dr. F. W. Langdon extols the virtues of common commercial benzine as an antiseptic and parasiticide. Locally applied, he has found it a cure for tinea versicolor and in furunculosis. It is also the most effective agent for the destruction of the chigger or chigoe. He suggests that it may also be useful, administered internally, in the treatment of trichiniasis. It is very cheap, and the chief caution to be remembered in its use is that its gas is highly explosive.

Methyl Violet for Cancer.—Von Mosetig, at Vienna, claims that methyl violet, injected into cancerous tissue, stops the growth of the cancer cell without injuring the patient. Several cases of complete cure are reported. Now, here is something tangible. Let us have more injections, more facts.

Seibert's Treatment of Diphtheria.—We lately noticed in the Journal the method of treating diphtheria proposed by Dr. A. Seibert, of New York. In the archives of Pediatrics for June, 1891, he reports thirty-five cases treated by the new method, with two deaths. In one of the fatal cases the patient had laryngeal diphtheria, and in the other the treatment was interfered with. In ten of the cases the disease was proven to be genuine diphtheria by finding the Klebs-Loeffler bacillus in the pseudo-membrane.

As before stated, the method consists in the submembranous injection of chlorine water at every point where the pseudo-membrane forms. The effect is prompt and decisive, and recovery is speedy and unattended by symptoms of paralysis. The matter seems to us to merit the most careful consideration.

Counting Tubercle Bacilli.—The Bulletin of the Johns Hopkins Hospital for May and June contains a paper by G. H. F. Nuttall, M. D., on "A Method for the Estimation of the Actual Number of Tubercle Bacilli in Tuberculous Sputum." Lack of space forbids an abstract of the article, and we mention it simply to call attention to the fact that methods hitherto employed are practically of no value.

EDITORIAL.

In another column of this issue appears an extended notice of the coming Annual Meeting of the American Society of Microscopists. This society, which we have seen steadily grow in the number of its members since 1878, the year of its organization, has in view the desirable end of bringing together those persons who have at heart the advancement of all branches of the science of microscopy. It thus exercises a peculiarly instructive and interesting function, and that which it accomplishes, it would be almost impossible to do in any other manner. The meeting of the present year, on August 11, which is to be held in Washington, D. C., promises to be particularly successful.

Within the last few years the National Capital has come to be regarded, and justly, as a city pre-eminently fitted for the holding of conventions. Many people who would hardly be persuaded to attend such meetings ordinarily, with the incidental expense and loss of time from business, would more willingly attend if to the main attraction were joined the important secondary one of a visit to the political centre of

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their country. Washington, too, is well equipped in a practical way to insure the comfort of large gatherings of people, and the great number of its hotels and boarding houses, with their consequent competition, is a guarantee that no exorbitant prices will be charged for accommodations. To the microscopist, however, a trip to Washington must prove especially significant. In this city he has access to such scientific depositories as the Army Medical Museum, National Museum, Smithsonian Institution, Department of Agriculture, and the local Universities.

The following committees have been appointed to make arrangements for the comfort of the visiting scientists:

Finance: Mr. J. M. Yznaga, chairman; Messrs. E. A. Balloch, A. B. Coolidge, T. B. Hood, L. D. Wilson, H. A. Robbins, W. C. Duff, D. K. Shute, T. W. Smillie, W. H. Wilmer, and E. A. Burdick.

Reception: Dr. J. M. Lamb, chairman; Messrs. C. H. Stowell, J. M. Stedman, I. W. Blackburn, V. A. Moore, S. J. Radcliffe, C. W. Richardson, R. Foster, A. N. Skinner, H. A. Dobson, and L. M. Mooers.

Place of Meeting and Printing: Dr. Robert Reyburn, chairman: Messrs. Thos. Taylor, W. W. Alleger, W. H. Seaman, C. T. Caldwell, J. M. Flint, H. L. E. Johnson, J. F. Scott, G. B. Young, R. A. Foster, and G. H. Penrose.

Railroads: Mr. H. H. Doubleday, chairman; Messrs. C. Marshall, C. W. Smiley, G. N. Acker, E. A. Gibbs, F. T. Chapman, J. Grimsted, D. S. Lamb, E. G. Seibert, and W. E. Schneider.

An Elegant Slide.—At the May meeting of the San Francisco Microscopical Society Mr. Runyon exhibited a slide prepared by Thum, of Leipzig, and presented by the San Francisco College of Pharmacy to A. H. Breckenfield, in recognition of his valuable course of lectures on "Microscopy" before the class of last year. This slide contained 1,230 diatoms, arranged in the form of a monogram. It was stated that 112 hours of patient labor had been expended in its preparation.

MICROSCOPICAL SOCIETIES.

Boston Scientific Society.

January 27, 1891, 223d Corporate Meeting.—The essayist of the evening was the Vice-President, Dr. Frank Perrin, D. D. S., who read a paper on "Tooth Development." Dr. Perrin's paper was in a measure supplementary to a paper delivered by him at a previous meeting, on the composition of the teeth. He described the gradual development, from the papilla in the primary dental groove to the fully grown tooth, illustrating each stage most thoroughly by lantern slides, nearly all of which were prepared by the lecturer. The paper was very interesting, and treated in a popular way of a subject which is little known outside of the medical profession.

April 14, 1891.—Mr. W. D. Grier read a paper on "The External Anatomy of Insects." Mr. Grier remarked, that although insects make up about four-fifths of the animal kingdom, comparatively few people know exactly what an insect is. An insect is an animal whose

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body is built up of a number of hollow, jointed rings composed chiefly of a peculiar substance termed "chitine," having the chemical formula $C_{17}\ H_{14}\ NO_{11}$. The rings composing the body are grouped into three general divisions, termed, respectively, the head, thorax, and abdomen. The thorax is furnished with six legs, *invariably*, and sometimes with two or four wings. Mr. Grier threw on the screen a view of a dissected cricket, and described the general topography of the insect. After this he exhibited views of the anatomy, in detail, of the cricket and locust, which insects he selected as being good types of the order in general. After showing the typically formed organs and appendages, he showed the principal variation in form in the more specialized insects which fitted them for their different modes of life. In concluding, the lecturer expressed his thanks to Messrs. F. A. Bates, Wm. Tower, and E. J. Smith, for their assistance in collecting insects for dissection, etc. The paper was fully illustrated with about thirty-six lantern views from Mr. Grier's original dissections. He was assisted by Messrs. Storer and Wilson, who managed the lantern.

April 28, 1891.—Mr. F. A. Bates read an entertaining essay on "The development and habits of insects (including comments on the gypsy moth, and fur and carpet pests), illustrated with the lantern. After a short description of the development of insects, Mr. Bates told about the gypsy moth which has overrun southeastern New England. After discussing the various remedies of spraying the trees with paris-green, etc., he said that the only way to exterminate the pest was to distribute good, colored cuts of the moth among the farmers; this could be done at a comparatively small cost, and by enabling the farmers to recognize and destroy the adult insect *before* it has time to lay its eggs would more than pay for the trouble and expense. Spraying the trees and otherwise attempting to kill the larvæ and eggs is "locking the stable door after the horse is stolen," as although it is the larvæ that actually *does* the damage, it is the adult which lays its innumerable eggs, each of which will hatch out and produce more larvæ with insatiable appetites for fresh leaves. So by killing the adult we attack the trouble at the root. These moths have already cost the State of Massachusetts many thousands of dollars in the effort to stay their ravages Mr. Bates described the "buffalo bug" and other household pests, and the remedies and preventives: camphor, naphtha, etc., etc. He exhibited a series of these troublesome insects mounted on cards, which were passed around through the audience. After Mr. Bates had concluded, an informal discussion of the subject by the secretary and others took place. Mr. Bates was tendered a vote of thanks by the Society for his excellent paper.

NOTICES OF BOOKS.

Six Centuries of Work and Wages. A history of English labor. By J. E. Thorold Rogers, M. P. Price 25 cents. The Humboldt Publishing Co., New York.

This is the first number of the *Social Science Library*, which puts at the disposition of the public a record that is invaluable. It is the

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story of the struggle of the English poor against the avarice of priest and king, landlord and capitalist; a story told by the records of thousands of court rolls and stewards' accounts, compiled by unconscious historians who little dreamed of the tale the figures they so patiently added up would one day be made to tell. From the beginning of the thirteenth century, when almost every one not only possessed land but cultivated it; when a landless man was looked on as an outlaw and a stranger; when the use of the common pasture was without stint, and the arable land of the manor was usually communal; from that remote date to modern times, the motive was the cheapening of labor for the benefit of the monopolist. And surely no time could be more fitting than the present for publication of this work.

SUBSCRIBERS' NOTICES.

[These notices will be given six insertions in this column at 25 cents per line or fraction thereof.]

WANTED.—Vol. VII, No. 2 (Feb., 1886), of American Monthly Microscopical Journal.
A. G. YOUNG, State House, Augusta, Me.

WANTED.—Diatom material from America, Australia, and Asia in exchange for fossil and recent material from Denmark.
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C. A. STEPHENS' LABORATORY, Norway Lake, Maine.

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PROF. ORSON HOWARD, Salt Lake City, Utah.

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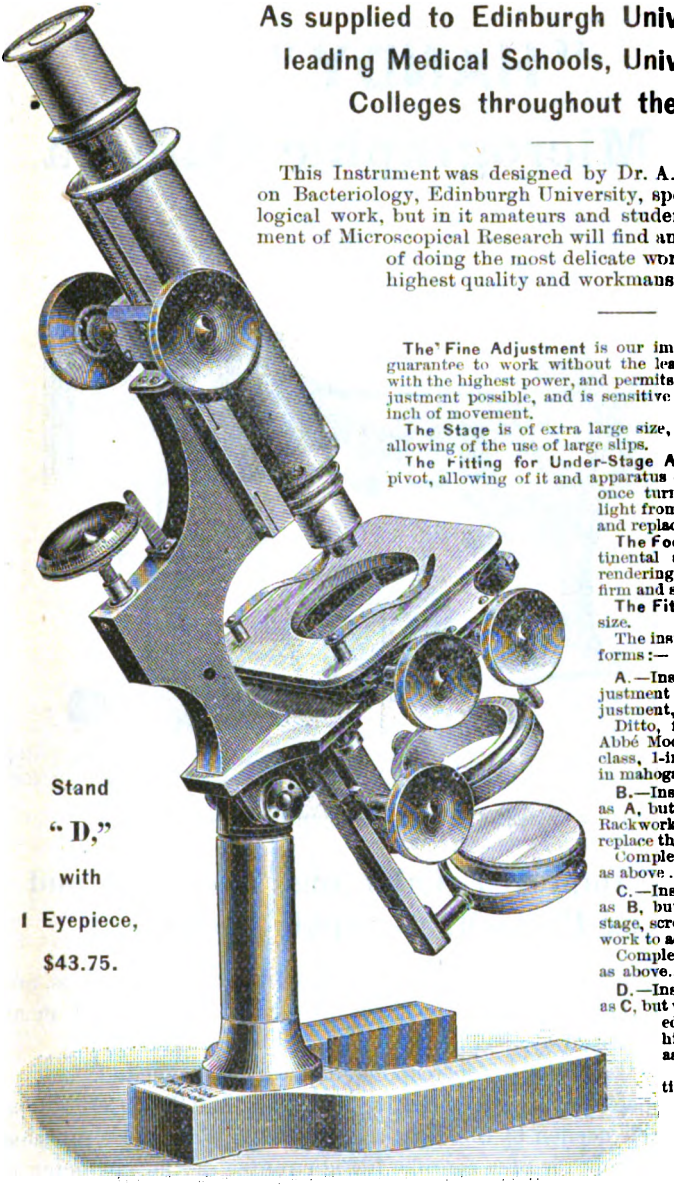

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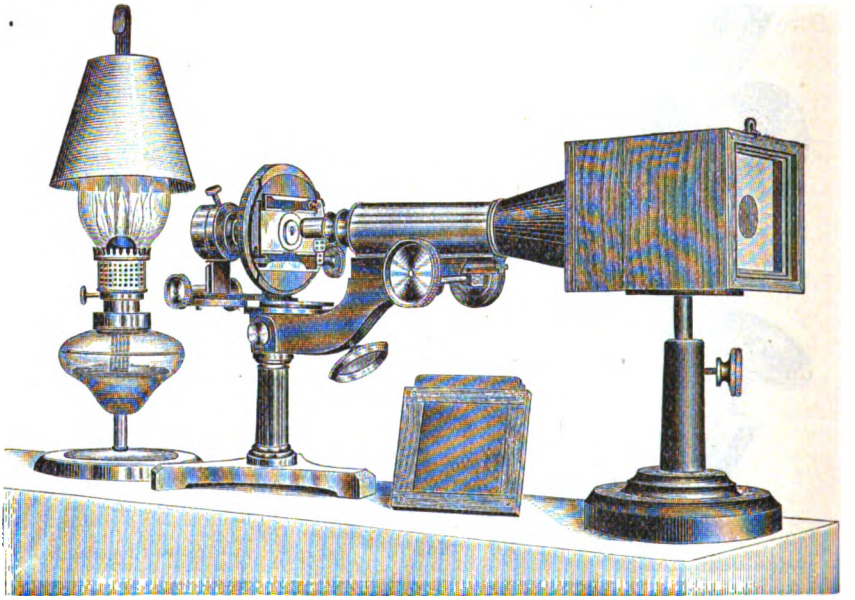

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During the year it is proposed to collect and publish in the *American Monthly Microscopical Journal* some statistics concerning Microscopy and the use of the microscope. Later, a directory will be published if sufficient encouragement is received. It is requested that the following questions be answered by every one to whom any of them apply. The answers will not be published in a way to expose any individual's personal affairs but will be compiled and used in totals. [Please number your answers from 1 to 17 to correspond with questions, and mail them to C. W. Smiley, Washington, D. C.]

1. Do you own a microscope?
2. What was its cost?
3. Of whose make is the stand and what pattern is it?
4. What objectives have you? What accessories?
5. How many mounts have you collected?
6. Do you wish to exchange mounts? What kinds?
7. To what extent did you use the microscope in 1889?
8. Of what microscopical periodicals have you files?
9. Have you ever engaged in photo-micrography?
10. Are you a teacher whose duties involve the use of the microscope? If so, what chair in what institution?
11. If an "amateur" or student, what time and study did you devote to the subject in 1889? Can you mount objects?
12. Are you in favor of or opposed to the present tariff on slides and instruments?
13. What societies in your vicinity give attention to microscopy? Give name of Secretary and his address?
14. What articles on microscopic subjects did you write in 1889? Where were they published?
15. What physicians of your acquaintance own or use microscopes?
16. Give names and addresses of any other persons interested in microscopy.
17. Give your name, occupation, and address.

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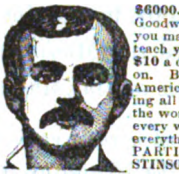

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MEDICAL AND SCIENTIFIC ABSTRACTING.

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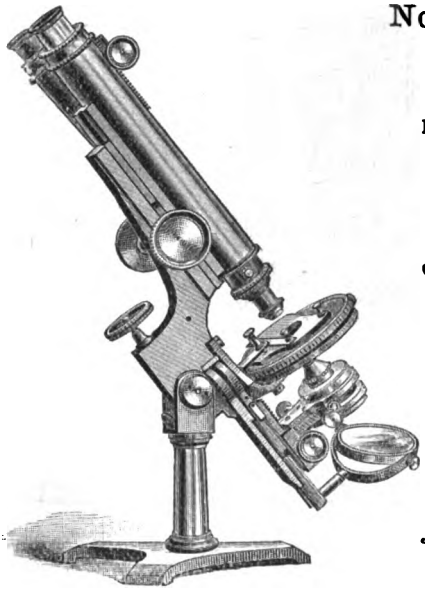

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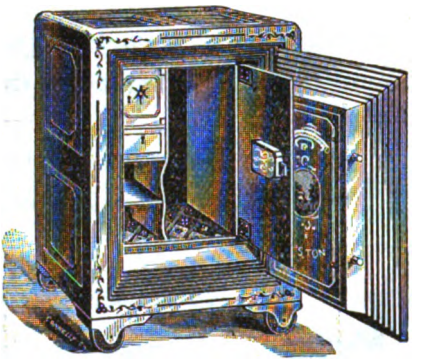

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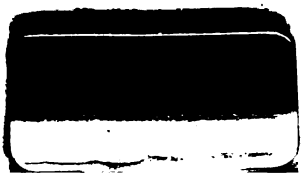

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